replace mechanical relays. In fact, by means of radio tubes it should be possible to build a circuit such that the current to the heater varies inversely as the reflective quality of the mirror. Then as moisture begins to appear on the mirror the heat applied to it will increase and the temperature of the mirror will be maintained continuously at the dew point, or at a level that bears a constant relation to it.

NOTES AND REVIEWS

W. J. HUMPHREYS. *Physics of the Air.* 3d edition. New York (McGraw-Hill Book Co.), 1940. 676 pp., 226 figs.

In the revision of this standard treatise, care has been taken not to alter the character or scope of the book. It remains a complete treatment of all types of physical phenomena in the atmosphere—thermodynamic, dynamic, electrical, acoustic, and optical—discussed from the physical point of view and, so far as possible, on an exact mathematical basis, but easily understandable by any reader who is familiar with elementary calculus and general physics; it is in general limited to the physical explanations of the phenomena, including but little descriptive meteorology and only occasional and incidental references to the working procedures of practical and applied meteorology or forecasting. The purpose of the book is to provide the reader with the sound foundation of scientific understanding of atmospheric phenomena in general that everyone engaged in any type of either practical or theoretical meteorological work should have; and although, since the appearance of the first edition, several other books on physical and dynamical meteorology have been published, there still is no other one treatise of like character and equally comprehensive scope in any language.

In this new edition, the type has been entirely reset, so that no restrictions were imposed on the character of the revisions. Deletions, modifications and additions occasioned by the advances in meteorological knowledge during the past 12 years have been freely introduced in large numbers throughout the work; but no extensive rewriting was necessary. One of the most striking changes from the preceding edition is the section on conditions in the very high atmosphere, pp. 75–78. Many of the former illustrations have been replaced by new ones based on later data. The revisions have increased the size of the book by about 20 pages.

METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR NOVEMBER 1940

[Climate and Crop Weather Division, J. B. KINCER in charge]

AEROLOGICAL OBSERVATIONS

By EARL C. THOM

The mean surface temperatures were below normal over most of the country during November (chart I), with mean temperature from 8° to 10° F. lower than normal in the northern portion of the Rocky Mountain Plateau region. Temperatures were slightly above normal for the month in most of the extreme eastern portion of the country, as well as along the Gulf coast and along the Pacific coast southward from central Oregon.

At the 1,500 m. level the directions of the resultant winds at most stations were south of normal for the month. The opposite turning occurred over the New England States, the Great Lakes and over the Central Appalachian region as well as over a small area in the west central part of the country. As will be noted from chart IX none of the pilot-balloon stations located along the Pacific coast, in the North Central States, or in the northeastern part of the United States had 10 or more 5 a. m. balloon observations which reached the level of 3,000 m. Except at Atlanta, Ga., the direction of the resultant winds were south of the normal direction at the 3,000 m. level for all stations for which this comparison was made. At 5,000 meters the direction of the 5 p. m. resultant wind was slightly north of the corresponding 5 a. m. normal for the month at Billings, Mont., while the direction of the 5 p. m. resultant wind at Omaha, Nebr., agreed with the morning normal for the month. At no other stations in the northern half of the country did 10 or more 5 p. m. balloon observations reach 5,000 meters during the month (see chart X). In the southern half of the country the directions of the 5 p. m. resultant winds were north of the corresponding 5 a. m. normals along the Pacific coast and were south of these normals to the eastward.

The 5 a. m. resultant velocities at 1,500 meters were lower than normal for the month, except that small positive departures occurred in the extreme northwest and in a narrow strip in the east central and south central parts of the country. At the 3,000 m. level 5 a. m. resultant velocities were below normal over the northern half of the Rocky Mountain Plateau and were above normal to the east and south of this area. As noted above, the 5 a. m. resultants at 3,000 meters were not available this month for a considerable part of the country. Resultant velocities observed at 5 p. m. were above the corresponding 5 a. m. normals for the month at 5,000 meters at all stations for which such data were computed. The afternoon resultant velocities at this level were generally much higher than the a. m. normals, the largest positive departure, 14.7 m. p. s., being observed at St. Louis, Mo.

The agreement between the mean surface temperature and the shift in the direction of the resultant from normal that had been apparent for several past months was not in evidence in November at any of the three lower levels, 1,500 meters, 3,000 meters, or 5,000 meters.

At the 1,500 m. level the directions of the 5 p. m. resultant winds were north of the direction of the corresponding 5 a. m. winds over the southeast and the Gulf coast, were south of the morning winds over the northeast and north central regions and showed no well defined tendency over the rest of the country. As noted before, a number of pilot-balloon stations did not have 5 a. m. resultants computed this month for the 3,000 m. level. Data available, however, would indicate a tendency of the direction of the resultant wind to shift to the southward during the day at this level over the central and west central parts of the country with no well-defined tendency over other areas.

The 5 p. m. resultant velocities for the month were higher than the corresponding 5 a. m. velocities at 1,500 meters along the Pacific coast and the northern half of the Atlantic coast and were lower than the morning velocities over most of the remainder of the country. At 3,000 meters the increases and decreases in resultant velocity from 5 a. m. to 5 p. m. were well distributed.

The upper-air data discussed above are based on 5 a. m. observations (charts VIII and IX) as well as on observations made at 5 p. m. (table 2, and charts X and XI).

The highest mean monthly pressure recorded at the 1,500 m. level by the raob and apob reporting stations of the United States was 856 mb. reported over both Pensacola, Fla. and Miami, Fla. At 2,000 and 2,500 meters the maximum mean pressure for the month was reported over Miami, Fla., while at 3,000 meters a maximum mean monthly pressure of 714 mb. was reported over both Brownsville, Tex., and Miami, Fla. At each of the standard levels from 4,000 meters to and including 16,000 meters the maximum mean monthly pressure was reported over Miami, Fla. At 17,000 and 18,000 meters maximum mean pressures for the month of 91 mb. and 77 mb., respectively, were reported over both Brownsville and Miami while the corresponding maximum, 64 mb., was recorded over Miami at 19,000 meters.

At each of the standard levels from 1,500 meters up to, and including, 16,000 meters the lowest mean pressure for the month was recorded over Sault Ste. Marie, Mich. The corresponding low pressure for the 17,000 m. level, 84 mb., was recorded over both Great Falls and Sault Ste. Marie. The minimum pressure at 18,000 meters was recorded over Great Falls while the corresponding minimum for 19,000 meters was again over Sault Ste. Marie.

Except at Sault Ste. Marie and at Joliet the mean pressures at 500 meters and 1,000 meters (m. s. l.) were the same or higher in November than in October over the United States. At 1,500 meters and higher levels mean pressures were generally lower than in the previous month. There were but few exceptions to this at any level and in no case was the mean pressure more than 1 mb. higher than in October. Mean pressures were considerably lower than last month at the higher levels, especially over the north central part of the country, for example at Bismarck the decrease in pressure from last month was an average of 11 mb. for the seven levels from 5,000 to 11,000 meters.

For the entire United States there was a difference of 31 mb. between the highest and lowest mean monthly pressure at each of the three levels, 7,000, 8,000, and 9,000 meters. The steepest pressure gradients for the month were recorded at the 7,000 m. level. At this level the isobars were quite evenly spaced and indicated a steep pressure gradient from north to south over any part of the extreme eastern states, for example, there was a difference of 25 mb. between the mean pressure at Sault Ste. Marie (401 mb.) and that at Charleston (426 mb.) or a change in pressure of 1 mb. for each 40 miles of horizontal distance.

Mean temperatures were generally lower this month than in October at the surface and at all levels up to and including 7,000 meters. The only exceptions to this fall in temperature were recorded at some of the higher of these levels at Charleston and at Pensacola. At all six levels from 8,000 meters up to and including 13,000 meters temperatures were also lower than last month at most stations while at the next six 1,000 meter levels temperatures were higher than last month almost without exception from the Rocky Mountain Plateau eastward to the Mississippi and were lower at these levels over the rest of the country.

Mean monthly temperatures for November this year were lower than the corresponding November temperatures last year at all levels above the surface and up to 5,000 meters over the western part of the United States and over the northern half of the Central States including most of the Great Lakes region. Temperatures were generally higher than last year at these levels over the rest of the country. At higher levels the eastern half of the country was warmer than last year at levels from 7,000 meters to about 12,000 meters and then cooler than last year up to 17,000 meters. Corresponding temperature tendencies at levels above 5,000 meters were not well defined over the western part of the country.

The mean surface temperature for the month of November as reported by raob stations (table 1) was below freezing over the northern Great Lakes, the extreme north central states and over most of the Rocky Mountain and Plateau region north of about 38° N. latitude. This mean value is computed from surface temperatures at the time raob observations are made and will approximate the mean of the daily minimum temperatures in this area. Over the rest of the United States the altitude at which a mean temperature of 0° C .was observed during November varied from 4,400 meters over Brownsville, Tex., to 1,000 meters (m. s. l.) over Joliet, Ill. The level of mean freezing temperature was 3,000 m. or higher during November over all of the country south of 35° N. latitude. Except along the south Atlantic and Gulf coasts mean freezing temperatures occurred at much lower levels than in October, at Joliet for example, the altitude of mean freezing temperatures in November was 2,100 meters lower than in October.

The extreme minimum temperature for the month recorded by radiosondes in the free air over the United States was −84.2° C. (−119.6° F.) observed over Miami, Fla. on November 30 at a height of 16,400 meters. A minimum temperature of −80° C. or lower was recorded at three other stations in the extreme southern part of the United States during the month while three northeastern stations reported extreme minimum temperatures for the month higher than −70° C.

Table 3 shows the maximum free-air wind velocities and their directions for various sections of the United States during November as determined by pilot-balloon observations. The extreme maximum wind velocity reported for the month was 98.4 meters per second (220 miles per hour) observed over Winnemucca, Nev., on November 22. This high wind was blowing from the north at an elevation of 11,120 meters (about 7 miles) above sea level. Another wind of unusually high velocity (97.8 m.p.s.) was reported on November 26 as blowing from the West at an elevation of 12,014 meters over Greensboro, N. C. The highest wind velocity previously reported in November during the last four years was a wind of 90.0 m.p.s. from the WSW at about 12,000 meters over Winslow, Ariz., on November 14, 1938. At levels below 5,000 m. the maximum wind velocities observed during November for the past 4 years have been considerably lower than the extreme wind velocities at higher levels. The maximum wind velocity for November in this period was 55.8 m.p.s. for the free-air layer from the surface to 2,500 meters and 69.1 m.p.s. in the middle levels from 2,500 to 5,000 meters.

Tropopause data for November showing the mean altitude and temperature of the tropopause at various stations are shown in table 4 and on chart XIII.

MEAN ISENTROPIC CHART [1]

The mean isentropic chart for November suggests no significant correlations with the weather of the month. This is in part due to the wide variance in circulation patterns during the month, with slow-moving systems and extensive north and south movements of warm moist and cold dry air, respectively, near the middle of the month and rapid west to east movement near the end of the month.

The change from the previous month reflects the normal seasonal trend toward more active westerlies farther to the south with less opportunity for persistent vortices to develop over the continental United States.

[1] Prepared by A. K. Showalter, Hydrometeorological Section.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during November 1940*

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Anchorage, Alas. (41 m.)				Bismarck, N. Dak. (505 m.)				Brownsville, Tex. (6 m.)				Charleston, S. C. (14 m.)				Coco Solo, C. Z.[1,2] (15 m.)				Denver, Colo. (1,616 m.)				El Paso, Tex. (1,193 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	1,006	−4.4	80	30	960	−5.9	83	26	1,018	18.6	87	30	1,020	11.0	88	17	1,012	25.8	90	30	839	−1.2	70	30	884	7.7	60
500	30	950	−2.8	73					26	962	17.7	83	30	963	12.8	72	17	956	24.0	84								
1,000	30	891	−3.5	71	30	901	−4.9	77	26	907	14.9	82	30	907	10.9	68	17	903	20.9	80								
1,500	30	836	−5.6	69	30	846	−3.9	73	26	855	12.7	77	30	854	8.5	64	17	852	18.2	73					30	853	9.7	60
2,000	30	784	−7.8	69	30	793	−4.6	69	26	805	11.2	67	30	803	6.8	59	17	803	15.3	70	30	799	+2.4	68	30	802	7.6	54
2,500	30	735	−10.4	65	30	745	−6.0	65	26	758	9.4	64	30	756	5.2	54	15	757	12.8	55	30	751	0.0	63	30	755	5.2	50
3,000	30	689	−13.3	62	30	698	−8.4	62	26	714	7.8	57	30	711	3.6	44	14	713	10.3	52	30	705	−3.2	62	30	710	2.5	47
4,000	30	603	−19.8	59	30	613	−14.8	60	26	632	2.6	53	30	628	−1.0	40	8	632	4.2	44	30	621	−9.8	62	30	627	−3.3	45
5,000	30	526	−26.9	58	30	536	−21.4	59	26	558	−3.6	49	29	553	−6.5	42					30	544	−15.6	57	30	552	−9.9	43
6,000	29	457	−33.9	57	30	467	−27.7	59	26	491	−10.0	42	29	486	−12.7	41					30	476	−22.2	52	30	484	−16.4	39
7,000	27	395	−41.1		30	406	−34.8	58	26	430	−16.5	39	29	426	−19.3	40					29	414	−29.3	50	30	423	−22.8	36
8,000	27	340	−47.9		29	350	−42.2		26	376	−23.5	39	27	371	−26.2	40					29	360	−36.7	50	29	368	−29.7	35
9,000	27	292	−53.3		29	302	−49.1		26	327	−30.5	37	27	322	−33.4	40					29	310	−44.7		29	319	−36.7	34
10,000	25	250	−55.4		29	259	−54.2		25	284	−38.0	34	26	279	−40.9						28	267	−51.4		27	276	−44.4	
11,000	25	214	−55.6		29	221	−56.5		25	245	−46.0		26	240	−48.1						28	228	−55.6		26	237	−51.8	
12,000	25	182	−54.3		29	189	−56.3		25	210	−53.8		26	206	−54.0						28	195	−57.6		24	202	−57.3	
13,000	21	156	−53.4		29	161	−56.2		25	179	−61.3		26	176	−60.7						27	166	−58.9		21	172	−61.7	
14,000	19	134	−53.4		29	138	−56.9		25	152	−68.1		26	149	−65.3						24	142	−61.0		20	147	−66.6	
15,000	17	114	−53.4		27	117	−57.9		24	128	−73.0		25	126	−68.3						23	121	−62.8		20	124	−68.1	
16,000	14	98	−53.6		24	100	−58.6		24	108	−75.3		24	107	−70.9						21	102	−63.6		19	105	−66.9	
17,000	12	84	−54.2		22	85	−58.9		22	91	−74.5		21	90	−71.7						18	87	−63.3		17	89	−65.8	
18,000	8	71	−54.7		13	73	−59.0		17	77	−70.5		16	76	−70.6						13	74	−62.9		13	76	−63.3	
19,000					7	62	−59.4		12	65	−65.0		15	64	−67.7						8	62	−61.8		10	64	−60.7	
20,000									8	55	−60.8		6	54	−65.6										5	55	−58.7	

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Ely, Nev. (1,908 m.)				Great Falls, Mont. (1,117 m.)				Joliet, Ill. (178 m.)				Juneau, Alaska (49 m.)				Ketchikan, Alaska (26 m.)				Lakehurst, N. J.[1] (39 m.)				Medford, Oreg. (401 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	811	−2.9	69	30	890	−3.5	74	30	998	1.3	85	27	1,010	1.0	66	28	1,012	4.1	80	30	1,015	4.6	83	30	973	5.5	88
500									30	959	0.9	84	27	954	−2.2	66	28	954	1.7	84	30	959	4.0	75	30	961	5.4	87
1,000									30	901	0.0	78	27	896	−5.0	69	28	897	−1.1	84	30	902	2.3	73	30	904	5.2	76
1,500					30	849	−2.2	69	30	846	−0.9	72	26	840	−6.9	72	28	842	−3.5	83	30	848	1.0	69	30	850	3.9	71
2,000	30	802	−0.8	66	30	796	−4.2	67	30	794	−2.5	69	22	786	−8.8	73	28	790	−5.9	80	30	796	−0.5	63	30	799	1.4	65
2,500	30	754	−0.8	58	30	747	−6.1	66	30	746	−4.6	66	22	738	−10.9	72	27	741	−8.8	77	30	748	−2.1	59	30	751	−1.0	61
3,000	30	708	−3.1	55	30	700	−9.4	67	30	700	−6.8	64	22	691	−14.0	68	27	694	−11.8	74	30	702	−4.2	59	30	705	−3.5	58
4,000	30	623	−8.6	50	30	615	−15.6	67	30	615	−12.3	57	22	605	−20.6	62	26	608	−18.3	70	30	617	−9.3	59	30	620	−9.2	53
5,000	30	547	−14.6	46	30	538	−22.0	62	30	539	−18.3	53	20	528	−27.5	56	26	532	−25.2	66	30	541	−15.2	58	30	545	−15.1	49
6,000	30	478	−21.7	44	30	469	−29.3	60	29	470	−24.9	51	20	458	−34.6	51	24	462	−32.0	64	29	474	−21.8	55	29	476	−21.8	46
7,000	30	417	−28.3	43	30	406	−36.2	58	28	409	−32.1	51	18	396	−41.6		24	400	−38.8	62	29	412	−28.5	57	28	415	−28.9	46
8,000	30	362	−35.5	43	30	351	−43.6		25	354	−39.1	51	17	341	−48.7		23	345	−45.3		28	358	−35.3	50	28	360	−36.2	44
9,000	30	313	−42.8		29	302	−49.7		22	306	−45.9		13	292	−54.1		20	296	−50.9		27	309	−41.9		27	311	−43.7	
10,000	29	269	−49.9		27	259	−54.6		19	263	−51.1		11	250	−56.5		19	254	−53.1		27	266	−48.2		27	267	−51.1	
11,000	28	230	−56.0		27	222	−56.8		18	225	−55.7		8	214	−55.5		19	218	−53.7		27	229	−53.6		26	229	−57.1	
12,000	28	197	−59.8		26	189	−56.8		17	192	−59.7		7	184	−54.8		19	186	−53.3		27	196	−57.6		25	195	−60.7	
13,000	27	167	−60.8		22	161	−56.6		16	163	−61.7		6	158	−54.8		16	160	−52.7		26	167	−60.4		23	166	−62.5	
14,000	26	143	−61.6		21	138	−57.2		15	139	−62.5		5	136	−55.1		14	136	−52.5		26	142	−62.1		22	141	−64.1	
15,000	26	121	−62.7		20	117	−58.3		14	118	−64.1						12	117	−52.8		20	121	−63.8		21	119	−64.9	
16,000	26	103	−63.2		14	100	−59.7		13	100	−64.2						9	101	−52.8		18	103	−64.8		21	101	−64.1	
17,000	20	88	−63.2		10	84	−59.6		9	85	−64.1						7	86	−53.3		10	87	−64.4		19	86	−63.7	
18,000	10	74	−62.0		7	71	−59.4		6	72	−64.3														18	73	−63.7	
19,000																									11	62	−63.2	

[1] U. S. Navy.

[2] Airplane observations.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during November 1940*—Continued

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Miami, Fla. (4 m.)				Nashville, Tenn. (180 m.)				Nome, Alaska (14 m.)				Norfolk, Va.[1] [2] (10 m.)				Oakland, Calif. (2 m.)				Oklahoma City, Okla. (391 m.)				Omaha, Nebr. (301 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	1,019	19.8	82	28	1,001	6.1	76	28	1,007	−3.8	83	23	1,024	8.4	77	29	1,019	10.5	76	29	975	5.4	79	30	985	0.6	81
500	30	962	18.8	78	28	963	6.6	74	28	947	−5.4	85	23	964	8.4	63	29	960	12.1	64	29	962	6.1	77	30	960	.7	77
1,000	30	908	15.9	79	28	906	5.1	70	28	889	−6.8	84	23	908	5.9	58	29	905	10.4	57	29	905	6.7	70	30	903	.4	72
1,500	30	856	13.0	78	28	852	3.7	64	28	833	−9.3	81	23	853	3.6	52	29	852	8.3	53	29	852	6.2	62	30	848	.7	65
2,000	30	806	11.5	66	28	801	2.2	59	28	781	−11.3	73	23	802	2.6	42	29	802	6.4	47	29	801	4.6	55	30	796	−.5	58
2,500	30	759	10.5	48	28	752	.4	53	28	731	−13.8	68	23	753	.2	40	29	754	4.2	40	29	753	2.6	52	30	748	−2.6	55
3,000	30	714	8.9	36	28	707	−1.4	49	28	684	−16.6	64	23	708	−2.1	34	29	709	1.4	35	29	708	.1	50	30	702	−4.8	53
4,000	29	633	4.0	28	27	623	−5.7	47	28	598	−22.6	62	23	624	−6.7	26	29	625	−4.5	32	29	624	−5.4	46	30	617	−11.0	49
5,000	28	559	−1.9	24	27	548	−11.3	41	28	521	−29.1	61	20	548	−12.3	24	29	550	−11.3	33	29	549	−11.7	43	30	542	−16.7	48
6,000	28	492	−8.1	22	25	480	−17.8	41	27	452	−36.0	58					29	482	−18.4	34	28	481	−18.1	39	30	473	−23.3	48
7,000	28	432	−14.5	24	25	420	−24.4	41	27	391	−42.8	58					29	421	−25.9	35	27	420	−25.4	39	29	412	−30.5	46
8,000	28	378	−22.0	24	25	365	−31.5	41	26	336	−48.9						29	365	−32.8	35	27	365	−32.7	36	29	357	−37.7	45
9,000	28	329	−29.6	23	24	316	−38.6	40	26	288	−53.0						29	316	−40.7		27	316	−40.4		28	308	−44.6	
10,000	28	286	−37.8	19	23	273	−45.7		26	247	−54.4						29	273	−48.9		27	273	−47.7		28	265	−50.5	
11,000	27	246	−46.1		23	234	−52.4		26	211	−53.7						27	234	−56.2		25	234	−53.5		28	227	−55.2	
12,000	26	212	−54.2		23	200	−57.9		26	181	−53.2						25	199	−60.6		21	200	−58.4		28	194	−57.3	
13,000	26	181	−61.8		22	171	−62.4		23	155	−51.9						24	169	−62.8		19	170	−62.9		26	165	−58.7	
14,000	26	153	−68.4		21	145	−65.8		22	133	−50.6						23	144	−63.0		17	145	−65.5		23	141	−60.2	
15,000	26	129	−73.1		20	122	−67.2		18	114	−50.5						23	122	−63.4		15	123	−67.8		21	119	−62.1	
16,000	26	109	−77.0		20	104	−68.2		14	97	−50.3						22	104	−65.3		13	104	−69.5		20	102	−62.7	
17,000	25	91	−78.6		18	87	−68.6		12	83	−50.6						19	88	−64.9		12	88	−70.2		17	86	−62.9	
18,000	21	77	−76.4		16	74	−67.8		7	72	−51.1						15	75	−63.8		10	75	−69.2		13	73	−62.3	
19,000	18	64	−71.9		11	62	−66.0										8	64	−63.8		5	63	−67.2					
20,000	12	55	−67.8		5	52	−64.7																					
21,000	8	46	−64.2																									

Stations with elevations in meters above sea level

Altitude (meters) m. s. l.	Pearl Harbor, T. H.[1] [2] (6 m.)				Pensacola, Fla.[1] [2] (24 m.)				Phoenix, Ariz. (339 m.)				Portland, Maine (9 m.)				San Diego, Calif.[1] (19 m.)				Sault Ste. Marie, Mich. (221 m.)				Seattle, Wash.[1] (27 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	29	1,014	22.1	86	27	1,021	12.3	80	30	977	11.1	63	28	1,014	1.2	86	30	1,014	14.9	75	30	990	−1.7	86	26	1,017	5.9	85
500	29	958	21.9	77	27	964	12.6	70	30	959	15.1	56	28	956	1.4	83	30	958	15.1	46	30	956	−3.1	89	26	959	4.8	78
1,000	29	904	19.2	78	27	908	11.4	58	30	903	14.2	47	28	898	−.5	82	30	902	13.1	37	30	897	−5.6	92	26	903	2.8	71
1,500	29	853	16.5	75	27	856	9.7	54	30	851	11.1	45	28	843	−1.6	79	30	851	10.7	32	30	841	−6.9	88	26	848	.4	68
2,000	29	804	14.5	62	27	805	7.8	53	30	801	8.0	45	28	792	−3.6	78	30	801	8.6	27	30	789	−8.7	85	26	797	−1.8	64
2,500	29	758	13.2	45	26	757	6.2	49	30	754	5.4	45	28	743	−5.4	75	30	754	6.4	23	30	739	−10.3	79	26	747	−4.7	58
3,000	29	714	11.7	30	26	712	3.9	46	30	709	2.6	44	28	697	−7.2	73	30	708	3.6	20	30	692	−11.8	74	26	701	−7.5	54
4,000	29	633	7.0	22	21	629	−1.7	48	28	626	−3.1	40	28	613	−12.2	66	30	625	−2.5	22	30	607	−16.5	69	26	615	−14.0	59
5,000	5	560	1.2	16	15	555	−7.4	46	28	551	−9.9	37	27	537	−17.4	64	30	550	−9.1	31	30	531	−22.4	66	25	538	−20.2	59
6,000					14	488	−13.7	48	27	483	−16.9	36	26	469	−23.6	62	30	483	−15.7	40	30	463	−29.3	65	25	470	−27.3	56
7,000					14	426	−20.7	55	27	422	−24.1	35	26	408	−30.6	63	29	422	−23.5	48	30	401	−36.1	62	25	409	−33.6	57
8,000					11	373	−27.9	58	26	367	−31.1	35	26	354	−37.6	61	26	367	−31.2	48	30	347	−43.1		24	353	−40.6	60
9,000					9	323	−35.2		25	318	−38.4	35	26	306	−44.4		23	318	−38.5		29	298	−49.1		24	305	−47.1	
10,000					8	280	−42.6		21	275	−45.9		26	263	−49.5		20	274	−46.0		28	256	−53.6		22	262	−52.5	
11,000					8	242	−49.8		21	236	−52.5		26	226	−53.3		18	236	−53.2		27	219	−56.1		21	225	−56.5	
12,000									18	202	−58.0		25	193	−55.7		16	201	−58.8		25	187	−56.3		21	192	−58.2	
13,000									18	171	−61.6		25	165	−56.9		12	170	−61.9		23	159	−56.8		21	164	−58.4	
14,000									15	145	−65.2		25	141	−57.5		11	146	−64.4		22	136	−58.4		19	140	−58.8	
15,000									14	123	−67.4		23	120	−58.3		7	123	−67.3		20	116	−60.0		18	119	−59.5	
16,000									13	104	−69.4		21	103	−59.6		6	104	−67.9		18	99	−60.8		13	101	−59.6	
17,000									12	88	−68.5		15	88	−59.8						15	84	−61.5		9	86	−59.2	
18,000									10	75	−67.0		14	75	−60.2						9	72	−62.1		7	73	−60.2	
19,000									5	63	−64.2		7	64	−60.5						6	61	−62.3					

[1] U. S. Navy.

[2] Airplane observations.

[3] Radiosonde and airplane observations.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees Centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during November 1940*—Continued

Altitude (meters) m. s. l.	Station with elevations in meters above sea level: Washington, D. C.[1] (7 m.)				Altitude (meters) m. s. l.	Station with elevations in meters above sea level: Washington, D. C.[1] (7 m.)				Altitude (meters) m. s. l.	Station with elevations in meters above sea level: Washington, D. C.[1] (7 m.)			
	Number of observations	Pressure	Temperature	Relative humidity		Number of observations	Pressure	Temperature	Relative humidity		Number of observations	Pressure	Temperature	Relative humidity
Surface	29	1,021	6.1	79	3,000	27	704	−3.3	55	8,000	10	361	−33.7	
500	29	961	5.4	73	4,000	27	619	−8.4	52	9,000	10	312	−40.5	
1,000	29	904	3.9	71	5,000	27	544	−13.8	53	10,000	6	269	−47.0	
1,500	29	850	2.5	69	6,000	27	476	−20.3	56	11,000	5	231	−52.7	
2,000	29	799	0.4	66	7,000	26	415	−27.2	61	12,000	5	198	−57.3	
2,500	29	750	−1.2	61										

LATE REPORT

Altitude (meters) M. S. L.	Stations and elevations in meters above sea level: Juneau, Alaska (49 m.)				Altitude (meters) M. S. L.	Stations and elevations in meters above sea level: Juneau, Alaska (49 m.)				Altitude (meters) M. S. L.	Stations and elevations in meters above sea level: Juneau, Alaska (49 m.)			
	Number of observations	Pressure	Temperature	Relative humidity		Number of observations	Pressure	Temperature	Relative humidity		Number of observations	Pressure	Temperature	Relative humidity
Surface	25	999	7.3	85	4,000	15	605	−15.7	71	11,000	7	216	−57.7	
500	25	946	5.5	80	5,000	13	529	−22.1	72	12,000	6	184	−56.4	
1,000	25	889	1.9	84	6,000	12	461	−29.1	68	13,000	6	157	−54.1	
1,500	24	835	−1.3	84	7,000	9	400	−36.7		14,000	6	134	−53.6	
2,000	22	784	−4.2	85	8,000	8	344	−44.3		15,000	6	114	−53.7	
2,500	21	736	−6.8	82	9,000	7	295	−50.9		16,000	5	97	−55.0	
3,000	19	690	−9.6	77	10,000	7	253	−55.0						

NOTE.—All observations taken at 12:30 a. m. 75th meridian time, except at Washington, D. C., and Lakehurst, N. J., where they are taken near 5 a. m., E. S. T., at Norfolk, Va., where they are taken at about 6 a. m., and at Pearl Harbor, T. H., shortly after sunrise.

None of the means included in this table are based on less than 15 surface or 5 standard level observations.

Number of observations refers to pressure only, as temperature and humidity data are missing for some observations at certain levels; also, the humidity data are not used in daily observations when the temperature is below −40° C.

[1] U. S. Navy.

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 5 p. m. (75th meridian time) during November 1940. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*

Altitude (meters) m. s. l.	Abilene, Tex. (537 m.)			Albuquerque N. Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (870 m.)			Browns-ville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burling-ton, Vt. (132 m.)			Charles-ton, S. C. (18 m.)			Chicago, Ill. (192 m.)			Cincin-nati, Ohio (157 m.)			Denver, Colo. (1,627 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	26	203	2.3	29	246	1.0	24	303	1.6	28	254	2.7	30	316	3.0	28	212	0.4	25	120	2.7	28	260	4.8	29	218	2.0	27	286	0.5	25	264	2.9	26	260	2.8	30	27	1.5
500							24	296	2.0										25	132	3.1	28	257	7.5	29	225	5.2	27	280	1.2	25	248	5.1	26	259	4.6			
1,000	26	210	3.2				24	303	2.2				29	312	5.2	28	143	0.5	25	168	2.3	23	250	9.5	27	252	6.5	26	266	2.8	21	263	6.8	24	252	6.6			
1,500	25	234	4.2				23	288	3.0	28	263	5.1	24	305	6.5	28	243	1.2	24	214	2.9	16	238	11.0	16	264	7.9	25	262	3.4	20	273	8.8	21	263	8.7			
2,000	24	251	6.2	29	186	1.2	23	277	5.6	27	278	6.6	19	306	8.6	24	249	3.9	20	223	4.0	11	265	14.1	12	264	9.8	24	270	4.9	19	269	9.9	17	267	9.8	30	9	1.2
2,500	23	258	7.8	29	264	4.3	22	287	7.9	25	283	9.0	19	298	10.6	20	270	4.4	18	221	4.7							24	274	6.3	19	275	11.4	15	275	11.4	29	284	2.0
3,000	23	263	9.0	29	273	7.2	18	290	9.1	24	289	9.2	19	298	11.8	16	280	4.1	15	233	6.3							22	276	9.2	19	278	13.1	15	278	14.0	29	281	4.0
4,000	22	267	11.2	24	281	12.2	17	273	13.2	22	294	12.6	15	294	15.3	14	291	6.6	14	257	7.2							19	263	12.6	16	283	16.7	12	274	16.3	26	284	8.7
5,000	21	269	13.7	22	281	16.1	17	270	17.5	18	301	15.0	13	296	17.1	12	320	8.1	13	264	7.8							17	258	14.6	15	292	21.2				23	276	14.3
6,000	18	273	15.6	21	281	19.0	15	272	17.9	15	313	16.7	12	292	19.0	10	326	9.4	11	269	10.5							12	279	16.6	13	291	25.8				20	281	18.8
8,000	14	270	22.7	18	276	18.5	12	287	23.3																											16	274	22.3
10,000				10	278	19.9	11	292	34.0																											13	277	27.8

TABLE 2.—*Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during November 1940. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*—Continued

Altitude (meters) m. s. l.	El Paso, Tex. (1,196 m.)			Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (766 m.)			Jacksonville, Fla. (14 m.)			Las Vegas, Nev. (570 m.)			Little Rock, Ark. (79 m.)			Medford, Oreg. (410 m.)			Miami, Fla. (10 m.)			Minneapolis, Minn. (261 m.)			Mobile, Ala. (10 m.)			Nashville, Tenn. (194 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	29	250	0.8	28	336	1.8	28	296	1.1	25	254	1.8	23	250	1.9	28	59	2.4	30	71	2.0	23	49	0.1	26	337	0.7	30	72	3.8	26	262	2.1	30	85	0.5	26	271	1.7
500	---	---	---	---	---	---	---	---	---	25	253	3.1	---	---	---	28	87	2.5	---	---	---	23	259	0.8	26	344	0.8	30	67	5.8	26	272	2.6	30	104	1.6	26	259	2.6
1,000	---	---	---	---	---	---	---	---	---	24	257	4.9	23	255	5.0	28	98	0.8	30	44	1.5	23	264	2.8	26	179	1.0	30	65	5.2	20	271	4.9	30	24	1.3	24	246	3.4
1,500	29	243	1.3	---	---	---	28	298	1.5	24	267	6.8	23	277	9.4	28	258	1.2	30	5	1.0	21	273	4.4	23	216	2.9	27	73	3.0	18	284	7.4	27	317	1.6	22	247	4.4
2,000	29	245	2.8	28	326	2.0	28	292	1.6	23	283	9.3	20	281	11.0	27	268	2.2	30	298	2.5	21	275	6.4	21	251	4.1	25	59	1.7	15	285	9.6	26	287	3.7	21	266	7.0
2,500	28	258	4.2	28	300	2.2	28	270	2.2	22	277	10.6	19	283	11.0	25	280	4.6	30	311	3.3	20	277	9.3	17	256	3.3	25	55	0.9	14	294	11.0	26	272	6.0	20	270	8.7
3,000	28	265	5.7	28	294	3.2	26	249	3.6	19	283	12.6	18	285	11.0	24	273	6.0	29	299	4.5	18	283	12.1	13	265	5.0	20	39	1.4	14	294	12.7	24	263	8.4	18	279	10.8
4,000	26	267	8.3	27	303	7.2	21	280	7.8	17	291	15.1	16	294	13.6	23	265	8.6	27	293	6.6	16	283	15.2	11	271	4.7	19	301	0.9	10	315	14.1	21	258	10.6	16	271	16.1
5,000	21	275	10.3	22	306	11.0	17	298	12.7	15	285	17.6	13	298	14.6	24	269	11.5	27	285	8.6	10	283	16.8	---	---	---	19	276	3.5	---	---	---	20	262	13.0	12	267	21.9
6,000	18	266	12.1	22	308	14.9	12	305	11.2	14	279	19.8	---	---	---	22	268	15.3	27	282	10.9	---	---	---	---	---	---	17	273	4.1	---	---	---	13	270	11.7	10	258	26.2
8,000	---	---	---	16	315	18.8	---	---	---	---	---	---	---	---	---	18	282	18.1	23	289	15.6	---	---	---	---	---	---	16	296	8.3	---	---	---	---	---	---	---	---	---
10,000	---	---	---	13	307	27.0	---	---	---	---	---	---	---	---	---	14	274	26.7	17	292	14.3	---	---	---	---	---	---	15	281	13.5	---	---	---	---	---	---	---	---	---
12,000	---	---	---	12	308	29.6	---	---	---	---	---	---	---	---	---	11	278	31.9	15	283	18.5	---	---	---	---	---	---	12	300	18.4	---	---	---	---	---	---	---	---	---
14,000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11	259	19.4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16,000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11	249	12.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Altitude (meters) m. s. l.	New York, N. Y. (15 m.)			Oakland, Calif. (8 m.)			Oklahoma City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (344 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			San Antonio, Tex. (183 m.)			San Diego, Calif. (15 m.)			Sault Ste. Marie, Mich. (230 m.)			Seattle, Wash. (14 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (10 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	29	280	3.7	28	280	2.1	24	182	1.7	27	284	1.8	30	84	0.3	28	342	4.3	24	268	2.7	27	128	1.2	29	292	3.3	19	321	2.6	27	202	0.6	22	186	1.2	27	293	2.0
500	28	269	6.4	28	353	1.5	24	193	1.8	27	279	1.7	30	124	.2	---	---	---	24	255	4.9	27	112	1.6	29	302	2.3	19	302	2.7	27	184	1.9	---	---	---	27	267	4.1
1,000	26	277	9.1	28	343	2.0	24	210	3.2	26	280	3.6	30	72	.5	28	342	4.4	24	251	6.4	24	215	1.1	29	353	.9	16	300	4.8	23	200	3.6	22	199	2.3	26	260	7.2
1,500	21	283	9.4	27	334	2.8	24	261	5.6	20	270	7.3	30	177	.6	28	305	6.5	21	266	7.9	21	241	3.5	28	35	1.7	12	299	7.1	20	210	4.8	20	226	3.6	23	271	10.8
2,000	16	288	8.6	25	328	3.3	24	265	7.7	17	280	9.0	30	235	2.1	27	300	8.1	20	269	11.1	18	263	4.1	25	26	1.8	---	---	---	19	227	5.8	16	239	5.7	20	284	13.7
2,500	---	---	---	25	330	4.8	23	266	9.5	17	286	10.9	30	276	2.2	26	302	10.0	19	273	10.8	17	262	5.5	24	360	2.2	---	---	---	19	238	6.9	16	264	6.4	19	280	14.4
3,000	---	---	---	25	322	5.7	22	271	10.5	17	286	12.0	30	280	3.6	26	302	10.8	18	278	12.6	15	270	7.3	23	319	3.3	---	---	---	15	249	6.7	15	281	7.6	17	285	16.0
4,000	---	---	---	23	318	7.6	19	281	14.7	16	297	15.7	26	290	5.6	24	299	11.0	16	289	16.2	12	278	9.7	22	325	4.5	---	---	---	13	262	8.6	12	298	9.9	16	292	19.0
5,000	---	---	---	21	312	7.9	18	281	17.1	14	290	20.1	26	285	7.0	24	292	15.8	15	286	18.3	---	---	---	21	316	4.6	---	---	---	---	---	---	---	---	---	15	284	23.0
6,000	---	---	---	19	317	12.6	17	283	21.2	14	289	23.6	24	287	9.6	20	294	18.9	12	290	20.4	---	---	---	12	315	5.3	---	---	---	---	---	---	---	---	---	12	291	26.2
8,000	---	---	---	11	299	13.7	---	---	---	---	---	---	18	276	15.5	15	290	23.1	10	300	27.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10,000	---	---	---	---	---	---	---	---	---	---	---	---	12	267	15.7	13	290	26.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12,000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11	287	24.4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

TABLE 3.—*Maximum free-air wind velocities (m. p. s.), for different sections of the United States, based on pilot-balloon observations during November 1940*

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station
Northeast [1]	47.0	WSW	2,100	12	Buffalo, N. Y.	62.4	WNW	3,610	22	Binghamton, N. Y.	60.0	WNW	8,030	21	Caribou, Maine.
East-Central [2]	36.6	NW	2,341	28	Greensboro, N. C.	46.4	WSW	4,141	29	Greensboro, N. C.	97.8	W	12,014	28	Greensboro, NC.
Southeast [3]	34.2	WSW	2,500	11	Birmingham, Ala.	55.6	SW	5,000	14	Atlanta, Ga.	70.5	W	12,790	28	Jacksonville, Fla.
North-Central [4]	41.0	WSW	2,090	12	Detroit, Mich.	45.5	NW	5,000	16	Fargo, N. Dak.	78.0	NW	9,712	28	Rapid City, N. Dak.
Central [5]	46.4	W	2,260	12	Moline, Ill.	45.0	WNW	4,600	2	Chicago, Ill.	74.0	W	11,580	27	Wichita, Kans.
South-Central [6]	36.0	WSW	2,270	10	Amarillo, Tex.	49.4	WSW	4,250	11	Houston, Tex.	75.0	SW	14,510	21	Abilene, Tex.
Northwest [7]	31.8	WNW	1,510	28	Billings, Mont.	44.0	WNW	4,310	28	Butte, Mont.	62.4	NNW	9,058	12	Spokane, Wash.
						44.0	W	4,510	29	Missoula, Mont.					
West-Central [8]	43.8	S	2,080	3	Modena, Utah.	47.8	NW	3,880	28	Denver, Colo.	98.4	N	11,120	22	Winnemucca, Nev.
Southwest [9]	35.2	WSW	2,458	10	Roswell, N. Mex.	49.9	WNW	5,000	11	Albuquerque, N. Mex.	71.5	WNW	13,340	10	Las Vegas, Nev.

[1] Maine, Vermont New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, Southern Ohio, Kentucky, eastern Tennessee, and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except extreme west Texas), and western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, northern Nevada, and northern California.
[9] Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

TABLE 4.—*Mean altitudes and temperatures of significant points identifiable as tropopauses during November 1940, classified according to the potential temperatures (10° intervals between 290° and 409° A.) with which they are identified (based on radiosonde observations)*

Stations	Anchorage, Alaska,			Bismarck, N. Dak.			Brownsville, Tex.			Charleston, S. C.			Denver, Colo.			El Paso, Tex.		
Potential temperatures, °A.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.
290–299	10	6.6	−43.9	2	6.8	−46.0							6	7.6	−42.7			
300–309	10	8.2	−51.7	14	8.0	−48.6												
310–319	19	9.2	−55.3	15	9.4	−54.0				2	9.6	−42.5	16	8.5	−43.6	3	7.6	−34.3
320–329	12	10.3	−59.4	25	10.5	−57.4	2	8.6	−32.0	12	8.8	−37.7	26	10.4	−55.2	10	9.6	−46.5
330–339	1	11.0	−57.0	4	11.3	−60.5	6	11.0	−49.8	11	10.8	−50.0	12	11.5	−58.8	21	11.6	−57.9
340–349	2	11.4	−55.0	3	12.2	−61.3	11	13.1	−64.6	18	12.6	−60.6	6	12.4	−60.7	8	12.7	−62.9
350–359	1	11.9	−54.0				21	14.3	−70.1	13	13.7	−66.2	2	14.0	−66.5	9	13.8	−67.2
360–369	1	11.7	−48.0	3	13.6	−63.0	11	15.4	−75.7	4	14.9	−71.2	5	13.8	−63.6	2	14.8	−72.5
370–379				2	14.5	−63.0	8	16.1	−77.0	10	15.5	−71.5	4	14.5	−64.2	5	15.1	−69.8
380–389	1	13.8	−55.0	4	14.4	−59.8	4	16.6	−76.2	6	16.0	−72.0	2	15.3	−68.0	8	15.8	−70.5
390–399	2	14.4	−55.0	2	14.8	−59.0	4	17.1	−76.8	5	16.6	−73.2	6	15.6	−64.7	4	16.5	−72.2
400–409					16.6	−69.0	1	17.3	−75.0	5	17.0	−71.6	2	15.6	−62.0	2	16.4	−68.5
Weighted means		9.3	−53.5		10.5	−55.8		14.4	−68.9		13.1	−60.4		11.2	−55.3		12.8	−60.8
Mean potential temperature, °A. (weighted)	318.0			328.3			358.9			354.4			337.7			350.1		
Number days with observations	25			29			24			25			27			21		

Stations	Ely, Nev.			Great Falls, Mont.			Joliet, Ill.			Ketchikan, Alaska			Lakehurst, N. J.			Medford, Oreg.			Miami, Fla.		
Potential temperatures, °A.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.
290–299				9	7.1	−48.9	3	6.2	−41.7	8	6.8	−46.4	1	5.5	−29.0	2	7.2	−44.5			
300–309	6	7.1	−40.2	15	7.6	−43.8	3	7.5	−47.0	14	8.1	−50.4	3	7.4	−40.7	3	7.1	−37.3			
310–319	12	8.5	−43.1	17	9.3	−52.0	7	8.9	−48.4	16	9.5	−55.8	6	8.9	−46.8	6	8.7	−45.0			
320–329	20	10.7	−57.1	18	10.7	−58.5	10	10.1	−53.5	7	10.3	−56.6	14	10.5	−49.1	27	10.5	−55.3	1	9.6	−41.0
330–339	22	18.2	−62.1	4	11.5	−61.0	9	11.8	−62.0	4	10.9	−55.8	17	11.5	−59.2	10	12.2	−66.3	11	10.4	−42.5
340–349	6	12.7	−64.5	1	11.5	−56.0	3	12.7	−64.7	1	11.7	−57.0	7	12.2	−61.3	3	12.5	−61.7	28	12.6	−59.2
350–359	3	13.2	−62.7				1	12.5	−58.0	1	11.9	−54.0	2	13.2	−63.0	5	13.3	−65.2	13	14.2	−69.2
360–369	1	12.9	−55.0	1	12.8	−55.0	2	13.0	−58.5	2	12.8	−55.5	2	13.8	−62.5	6	14.5	−69.2	8	15.2	−73.6
370–379	4	14.6	−64.2	1	15.9	−76.0	4	14.7	−65.5				3	14.7	−66.7	2	14.8	−66.5	10	16.2	−78.5
380–389	4	15.4	−67.0	2	15.6	−64.0	1	13.5	−53.0	1	14.3	−57.0	1	15.6	−67.0	5	14.9	−63.6	9	16.7	−76.8
390–399	7	16.1	−66.7				2	15.8	−65.5	1	14.8	−59.0	4	15.8	−64.8	1	15.8	−64.0	4	17.6	−80.2
400–409	4	16.0	−62.8	3	16.0	−64.3	2	15.7	−63.0	1	14.9	−56.0	1	14.8	−55.0						
Weighted means		11.7	−57.8		9.7	−53.3		11.1	−56.1		9.4	−53.2		11.5	−55.5		11.5	−58.1		13.9	−64.9
Mean potential temperature °A. (weighted)	341.0			321.5			336.6			319.5			338.7			336.7			356.2		
Number days with observations	28			28			18			21			27			24			26		

Stations	Nashville, Tenn.			Nome, Alaska			Oakland, Calif.			Oklahoma City, Okla.			Omaha, Nebr.			Phoenix, Ariz.			Portland, Me.		
Potential temperatures, °A.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.
290–299				11	6.9	−48.3							2	6.8	−47.5						
300–309				18	8.0	−49.7	2	6.8	−35.5	1	7.5	−45.0	6	7.7	−46.5	1	6.5	−30.0			
310–319	3	8.5	−43.7	11	9.5	−56.5	8	8.2	−40.0	4	8.8	−48.5	17	8.3	−42.1	3	7.3	−34.3	20	8.5	−47.1
320–329	12	9.3	−42.4	10	10.4	−59.9	20	10.6	−56.2	14	10.0	−48.9	23	10.4	−54.9	10	10.3	−51.5	17	10.3	−54.8
330–339	13	11.3	−56.0				14	12.0	−63.1	11	11.5	−57.9	11	11.4	−59.5	13	11.3	−56.2	11	11.3	−58.1
340–349	12	12.7	−62.7	1	10.6	−52.0	10	12.7	−64.4	6	12.7	−63.7	8	12.3	−60.9	6	12.6	−63.0	4	12.5	−63.5
350–359	8	13.6	−65.5				2	13.0	−60.0	7	13.2	−63.3	1	12.3	−57.0	7	13.7	−65.3	7	12.8	−58.6
360–369	7	14.3	−67.7	2	12.6	−54.5	1	14.4	−68.0	3	14.8	−71.0	6	13.6	−62.0	2	14.8	−70.5			
370–379	5	15.0	−67.8				5	14.2	−62.2	4	15.0	−68.5	3	14.5	−64.3	3	15.3	−71.3	1	13.1	−56.0
380–389	4	15.5	−67.5				3	15.8	−70.0	4	15.3	−67.5	6	15.0	−63.7	4	15.8	−70.0	5	14.2	−58.0
390–399	4	16.4	−71.2	1	13.9	−50.0	3	15.7	−65.0	4	16.2	−69.2	4	15.6	−66.2	2	16.1	−68.0	2	15.2	−60.5
400–409	4	16.8	−69.5				4	16.4	−65.8	3	17.2	−73.0	4	16.3	−65.0	2	16.8	−69.0	4	15.8	−61.8
Weighted means		12.7	−59.6		8.9	−52.9		11.9	−58.5		12.4	−59.7		11.2	−55.2		12.3	−58.9		11.1	−54.8
Mean potential temperature °A. (weighted)	351.2			311.7			342.0			348.1			338.7			346.1			338.5		
Number days with observations	22			26			24			19			27			18			25		

TABLE 4.—*Mean altitudes and temperatures of significant points identifiable as tropopauses during November 1940, classified according to the potential temperatures (10° intervals between 290° and 409° A.) with which they are identified (based on radiosonde observations)*—Con.

Stations	Sault Ste. Marie, Mich.			Seattle, Wash.			Stations	Sault Ste. Marie, Mich.			Seattle, Wash.		
Potential temperatures, °A.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Potential temperatures, °A.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m. s. l.	Mean temperature °C.
290-299	4	6.6	−44.2	1	7.8	−54.0	370-379	2	13.4	−58.5	1	14.4	−66.0
300-309	14	7.6	−45.1	6	8.2	−51.3	380-389	5	14.5	−60.2	1	13.8	−53.0
310-319	23	9.0	−51.3	4	9.4	−54.8	390-399	4	14.6	−58.2			
320-329	15	10.5	−58.3	16	10.3	−56.2	400-409	3	15.3	−59.0	1	16.0	−62.0
330-339	7	10.5	−53.6	5	12.0	−63.0	Weighted means		10.2	−53.1		10.6	−57.1
340-349	2	11.4	−57.0				Mean potential temperature °A., (weighted)		330.2			327.8	
350-359	1	11.7	−50.0				Number days with observations		27			22	
360-369	2	13.0	−61.5	2	14.4	−68.0							

WEATHER ON THE NORTH ATLANTIC OCEAN

By H. C. HUNTER

Atmospheric pressure.—The pressure during November 1940 averaged higher than normal over nearly all portions of the North Atlantic well covered by available reports. This is in contrast to the conditions during the preceding 2 months, when pressure below normal was the rule. The November departures were greatest over the southeastern region, Lisbon, Portugal, averaging 5.3 millibars (0.16 inch) above the normal for the month.

The extremes of pressure in the vessel reports available were 1,039.2 and 999.0 millibars (30.69 and 29.50 inches). The higher reading was noted on United States Coast Guard cutter *Mendota*, near 39½° N., 59° W., during the forenoon of the 12th. The low mark was recorded on the Honduran steamship *Iriona*, during the forenoon of the 27th, when about 130 miles to south-southwestward of Nantucket. Table 1 shows that within 48 hours of the *Iriona's* observation, readings somewhat lower were noted at the land stations at Nantucket and Halifax, and a reading decidedly lower at Belle Isle, Newfoundland.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, November 1940*

Station	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Millibars	*Millibars*	*Millibars*		*Millibars*	
Lisbon, Portugal	1,022.6	+5.3	1,032	3	1,006	16
Horta, Azores	1,024.3	+4.0	1,032	22	1,014	20
Belle Isle, Newfoundland	1,008.3	+0.2	1,038	12	961	29
Halifax, Nova Scotia	1,016.8	+2.6	1,038	11	994	28
Nantucket	1,018.6	+1.0	1,037	19	994	27
Hatteras	1,021.3	+1.7	1,036	19	1,006	27
Turks Island	1,015.0	−0.6	1,018	[1] 10	1,008	6
Key West	1,018.3	+1.7	1,024	17	1,013	7
New Orleans	1,021.3	+2.0	1,034	15	1,006	25

[1] Also several later dates.

NOTE.—All data based on available observations, departures compiled from best available normals related to time of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Cyclones and gales.—For the time of year the weather was comparatively quiet over those North Atlantic regions that are well covered by reports at hand. The period from the 15th to 24th was particularly free from strong winds.

A LOW system extending far in a north-south direction moved eastward off the North American coast on the 2d and 3d, and on the morning of the 4th was located approximately along the 58th meridian. The sole North Atlantic whole-gale report of the month was connected with this storm; it was made by the Coast Guard cutter *Pontchartrain*.

During the final week of the month another cyclonic system greatly affected the weather on the ocean, and brought usually lower barometric readings than the system just mentioned, although no wind force exceeding 9 (strong gale) is noted among the available reports. This LOW system crossed the coast line on the 27th and 28th, and traveled toward the northeast till beyond the field of observation.

Fog.—Remarkably few reports of fog have been received. However, it is worth noting that the first advices of Gulf of Mexico fog since spring came to hand; two occurrences over the north-central portion during the latter part of November have been reported.

Over the main North Atlantic waters there was fog on three dates, all during the first half of the month, to southeastward of New Jersey and Delaware, that is, in the 5° square, 35° to 40° N., 70° to 75° W. This is about the normal November amount of fog in the area. In the region adjacent to Cape Cod and western Nova Scotia, where normally fog is encountered on 4 days in November, no reports whatever for the current November have arrived.

Three fog reports have come, in addition to the five dates previously noted. One occurrence was to southeastward of Nova Scotia on the 16th; the other two relate to fog on the 12th and 13th a short distance to southwestward of Portugal in the square, 35° to 40° N., 10° to 15° W.